EASTMAN

Technical Data Sheet
CLEARWAY® F1

Applications

- Runway de-icing

Product Description

Eastman's de-icers are marketed under the brand name Clearway®. Clearway is acknowledged as one of the leaders in airport runway de-icing and the product range has been developed and expanded to include both liquid and solid formate-based and acetate-based products.

Based on a formulation of potassium formate and corrosion inhibitors, Clearway F1 is an effective de-icer for airport runways, taxiways and aprons. The product meets not only all relevant environmental and ecological requirements but also the AMS 1435 standard. Clearway F1 is classified WGK1*, both for its excellent biodegradability and because of its low aquatic toxicity. Thanks to these properties, this liquid de-icing solution carries the Blaue Engel ('Blue Angel') ecolabel.

When applied with the mechanical facilities of airport maintenance departments, Clearway F1 allows snow and ice to be removed quickly and economically.

Clearway F1 melts the ice by depressing the freezing point of water. Due to its low freezing point, the resultant solution will have a much lower freezing point.

**WGK is a German method of classifying chemicals into three (1-3) Water Hazard Classes. Following several tests the Clearway products have been classified as Class 1: low hazard to waters.*

Typical Properties

Property	Typical Value, Units
General	
Appearance	Clear liquid
Assay	50% min. active material
Density @ 20°C	 1.33-1.35 g/cm^3
Viscosity @ 0°C (32°F) @ 20°C	 Max. 5 mPa·s Max. 3 mPa·s
Flash Point Abel closed cup	 Non-flammable
Freezing Point (fluid diluted 1:1)	 -17 °C <-60 °C
Miscibility with water	Complete
pH	10.5 < pH < 11.5

Handling Precautions

Clearway F1 is delivered ready to use. It should not be diluted nor should it be concentrated further.

Clearway F1 is compatible with most known materials used at airports, both related to equipment for storage and equipment for applying the product.

Clearway F1 shows moderate corrosive effect on zinc, galvanized material, solder and silver. We recommend painting or protecting these items or replace them with items of compatible materials.

The table below list materials that have been shown to be compatible with Clearway F1.

METALS
Stainless Steel
Carbon Steel
Aluminium alloys (bare & anodized)
Magnesium alloys (wrought, dichromate treated and epoxy coated)
Titanium
Cadmium plated steel
Copper (acid pickled)
Bronze (copper/tin)

POLYMERS
Polyethylene Plastics
Glass fiber reinforced polyester (high pH resistant resin)
Polymethacrylate
Acrylic plastic
Polychloroprene
Silicone
Vulcanized butadiene-acrylonitrite
Vulcanized butadiene-propylene
Painted surfaces
Bitumen

Environmental and toxicology information
All tests are conducted according to international guidelines and specifications, and are performed by test institutes recognized by the industry as one of the leaders in their field of expertize. Clearway F1 is assigned as Class 1 (WGK), which means it is in general not water endanger-ring.

BOD_5		90 mg O_2/g
COD		110 mg O_2/g
Acute toxicity to Daphnia Magna	EC_{50} (48 h)	> 2.000 mg/l
Acute toxicity to Fish	LC_{50} (48 h)	> 2.000 mg/l
Acute oral toxicity	LD_{50} (rat)	> 2.000 mg/kg

Application
Clearway F1 is used as both anti-icing and de-icing chemical. Suggested application rates can be found in the table below. It is however important to take into consideration factors like surface material, surface structure, application-method and current weather situation when using the product. The below figures is therefore only a guide for application and must not be regarded as recommended dosage. We will give advice upon request on application for the respective airport.

In case of thick ice-layers (> 3 mm) it is recommended to use Clearway F1 in combination with the solid product Clearway SF3.

In the case of de-icing, the surface should be treated mechanically before applying Clearway F1. This will reduce the amount of liquid used, resulting in minimal environmental impact and lower cost of the de-icing operation.

In the event of freezing rain, a preventive treatment of runways, ramps and taxiways is highly recommended. Applying Clearway F1 before the start of a light snow or ice event prevents frozen precipitation from accumulating. Since Clearway F1 is both an anti-icing agent as well as a deicer, timely application of Clearway F1 is essential to the continued use of operative surfaces.

Careful monitoring of meteorological conditions will keep you ahead of storm events, and guide you in preventive application of the product.

Clearway F1 can be used with all known existing spraying equipment.

SUGGESTED APPLICATION RATES:

	Dry Conditions **Ice thickness <1mm** **Light frost**		**Wet conditions** **Ice thickness <1mm** **Heavy frost**		**Wet conditions** **Snow** **Packed snow**		**Wet conditions** **Freezing rain** **Ice Thickness 1-3 mm**	
Temperature (^{o}C)	Anti-Icing	De-Icing	Anti-Icing	De-Icing	Anti-Icing	De-Icing	Anti-Icing	De-Icing
0 to - 5	15 g/m^2	20 g/m^2	20 g/m^2	30 g/m^2	30 g/m^2	40 g/m^2	40 g/m^2	50 g/m^2
-5 to - 10	25 g/m^2	30 g/m^2	30 g/m^2	40 g/m^2	40 g/m^2	50 g/m^2	50 g/m^2	60 g/m^2
-10 to - 15	30 g/m^2	40 g/m^2	40 g/m^2	50 g/m^2	50 g/m^2	60 g/m^2	60 g/m^2	60 g/m^2

Packaging

Clearway F1 is available as bulk and in 1000 L IBC-containers.

Storage

Clearway F1 meets the requirements of AMS 1435 for storage stability and shows no sign of deterioration when stored for a longer period of time.

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